



BSI Standards Publication

Industrial valves — Isolating valves for low-temperature applications

Part 2: Type testing (ISO 28921-2:2015)

National foreword

This British Standard is the UK implementation of EN ISO 28921-2:2017. It is identical to ISO 28921-2:2015. It supersedes BS ISO 28921-2:2015 which is withdrawn. Together with BS EN ISO 28921-1:2017, it also supersedes BS EN 12567:2000 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee PSE/18, Industrial valves, steam traps, actuators and safety devices against excessive pressure, to Subcommittee PSE/18/1, Industrial valves, steam traps, actuators and safety devices against excessive pressure - Valves - Basic standards.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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English Version

Industrial valves - Isolating valves for low-temperature applications - Part 2: Type testing (ISO 28921-2:2015)

Robinetterie industrielle - Robinets d'isolement pour application à basses températures - Partie 2: Essais de type (ISO 28921-2:2015)

Industriearmaturen - Absperrventile für die Anwendung im Niedertemperaturbereich - Teil 2: Typprüfung (ISO 28921-2:2015)

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European foreword

The text of ISO 28921-2:2015 has been prepared by Technical Committee ISO/TC 153 “Valves” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 28921-2:2017 by Technical Committee CEN/TC 69 “Industrial valves” the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2017, and conflicting national standards shall be withdrawn at the latest by August 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

EN ISO 28921-1 and EN ISO 28921-2 supersede EN 12567:2000.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 28921-2:2015 has been approved by CEN as EN ISO 28921-2:2017 without any modification.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is Technical Committee ISO/TC 153, *Valves*, Subcommittee SC 1, *Design, manufacture, marking and testing*.

ISO 28921 consists of the following parts, under the general title *Industrial valves — Isolating valves for low-temperature applications*:

- *Part 1: Design, manufacturing and production testing*
- *Part 2: Type testing*

Industrial valves — Isolating valves for low-temperature applications —

Part 2: Type testing

WARNING — Persons using this International Standard should be familiar with normal laboratory practice. This International Standard does not purport to address all of the safety issues, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory requirements.

1 Scope

This part of ISO 28921 specifies requirements for the type testing of isolating valves for low-temperature applications to verify the performance of valves at a low temperature from $-50\text{ }^{\circ}\text{C}$ down to $-196\text{ }^{\circ}\text{C}$.

NOTE Nominal sizes (DN), nominal pipe sizes (NPS), nominal pressure (PN) and Classes are covered in ISO 28921-1.

This part of ISO 28921 does not evaluate valve actuators unless they are integral part of the valve. Valves during testing can be operated manually or an actuator can be used during the testing. The effect of cold gas vapours during testing is taken into consideration in particular if the actuator is mounted directly over the test stand with the cold gases engulfing the actuator.

This part of ISO 28921 does not apply to valves for cryogenic services, designed in accordance with ISO 21011, used with cryogenic vessels.

2 Normative references

The following referenced documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5208, *Industrial valves — Pressure testing of metallic valves*

ISO 28921-1, *Industrial valves — Isolating valves for low-temperature applications — Part 1: Design, manufacturing and production testing*

ASME B31.3, *Process Piping*

EN 13480-2, *Metallic industrial piping — Part 2: Materials*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 28921-1 and the following apply.

3.1

symmetric seated valve

valve with an internal construction which has a plane of symmetry perpendicular to the axis of the body ends

Note 1 to entry: This is a valve where both seat sealing elements are identical.

3.2

asymmetric seated valve

valve with an internal construction which has no plane of symmetry perpendicular to the axis of the body ends

Note 1 to entry: This is a valve with a single seat offset from the shaft centreline.

3.3

design family

valves of the same type for which the basic design for the outside pressure retaining envelope, in particular the body construction, is the same design for all sizes of the valve range and the same stem movement

Note 1 to entry: Valves of the same type include, for example, gate, globe, ball valves.

Note 2 to entry: Examples of body construction include one piece, two piece or three piece body, bonnet extension.

Note 3 to entry: Examples of stem movement include raising and not rotating.

Note 4 to entry: Valves are considered to be of the same design family if they can all be depicted on one dimensionless cross-sectional drawing, with all the external dimensions added in a table on the same drawing.

3.4

cold working pressure

CWP

maximum fluid pressure assigned to a valve for operation at a fluid temperature up to 38 °C

3.5

operational cycle

motion of the stem that moves a valve obturator from the fully closed position to the fully open position and returns to the fully closed position

Note 1 to entry: For check valves, an operational cycle is when the obturator moves from the closed position to open and back to the closed position.

4 Test conditions

4.1 Valve selection

Inspection and testing under this part of ISO 28921 shall be carried out on a randomly selected production valve of a design family and of a particular material of construction. Size selection shall be at mid-range of the design range, the valve PN or Class shall be selected so that it qualifies all valves of the same PN or Class and all valves of the lower PN or Class as long as the valves are of an identical design. Valves of the same design family and the same materials of construction tested at lower temperature qualify valves for applications at higher temperatures up to ambient temperature.

NOTE The mid-range valve size selected for testing varies with the size range available from the valve manufacturer. For example, if the valve offering of a particular valve design is DN 50, DN 65, DN 80, DN 100, DN 150 and DN 200 or NPS 2, NPS 2 ½, NPS 3, NPS 4, NPS 6 and NPS 8, the mid-range valve selected for testing is DN 80 or DN 100, and for NPS valves, it is NPS 3 or NPS 4. Either of the two sizes is acceptable. Alternatively, the size to be tested can be decided by an agreement between the manufacturer and the purchaser.

4.2 Testing criteria and selection of valve design

4.2.1 General

The test valve submitted for this type test shall be subjected to:

- 200 operational cycles for on-off valves;
- three operational cycles only, for check valves.

4.2.2 Representative valve design selection

Valve selected for this type testing shall be representative for each design family of the valve type (e.g. gate, globe, ball valve) and closure member type (e.g. single seated, double seated, unidirectional, bi-directional).

The test valve shall be of the same design as the other valves covered by this type test as far as the body and bonnet configuration is concerned (e.g. one piece or multiple piece body construction, integral or bolted on bonnet and the same gaskets types between those valve parts).

4.2.3 Selection and qualification of sealing elements

The pressure retaining seals and packing in the test valve shall be of the same design and materials of construction as all other valves covered by extension by this type test.

4.3 Requirements for test valve, direction for installation and conditions

4.3.1 Valves designed as symmetric or asymmetric seated valves, intended for the installation in both directions shall be tested in both directions.

4.3.2 Valves designed for unidirectional sealing shall be marked outside the valve body accordingly and shall be tested in one direction only.

4.4 Preparation for low temperature test

4.4.1 General

Valves submitted for low temperature testing shall be internally clean and free of all water, lubricants, sealants and oils unless otherwise agreed upon between the user and the valve manufacturer. ISO 23208 may be used as a guideline for cleaning of valve components as well as assembled valves subjected to low temperature type testing.

4.4.2 Valve tests

Shell and seat testing shall be in accordance with ISO 5208. The shell test pressure shall be $1,1 \times \text{CWP}$ if tested with gas or $1,5 \times \text{CWP}$ if tested with alcohol or water. The seat closure test pressure shall be at $(6 \pm 1) \text{ bar}^1$. After each test is complete, the valve shall be thoroughly dried.

The type testing of valves at low temperature shall be carried out according to the test procedure in [Annex A](#).

An example of a low-temperature type test record is given in [Annex C](#).

4.4.3 Test equipment

4.4.3.1 The cooling medium shall be contained in an insulated stainless steel tank that is open on the top. Each test valve shall be blinded with blind flanges that are equipped with support brackets as necessary and small bore austenitic stainless steel tubing connected to the pressurizing media.

4.4.3.2 Thermocouples shall be attached to the valve body, bonnet and end flange, except that the number of thermocouples may be reduced where the size of the test valve makes the use of multiple thermocouples impracticable. However, in all cases, a minimum of one thermocouple, located in the valve bonnet area and one inside the valve are required. A minimum of one thermocouple shall be provided to monitor the temperature of the cooling medium.

1) $1 \text{ bar} = 0,1 \text{ MPa} = 10^5 \text{ Pa}$; $1 \text{ MPa} = 1 \text{ N/mm}^2$ (bar is a unit deprecated by ISO).